APPENDIX E

Reference Exposure Levels Used in the HRA Program (Version 2.0e)

Table E.2 Noncancer Reference Exposure Levels (Chronic) Used In The HRA Program (Version 2.0e).								
Chemical	**Inhalation (µg/m³)**	**Modification Made To Database**						
1,2-DIBROMO-3-CHLOROPROPANE (DBCP)	2.0E-01							
1,2-EPOXYBUTANE	2.0E+01	A				E		
1,4-DIOXANE *	3.0E+03			C	D			
1,3-BUTADIENE	2.0E+01		B					
2-CHLOROACETOPHENONE[RfC]	3.0E-02	A				E		
2-CHLOROPHENOL	1.8E+01							
2-NITROPROPANE	2.0E+01							
4,4'-METHYLENE DIANILINE (AND ITS DICHLORIDE)	2.0E+01			C	D			
ACETALDEHYDE	9.0E+00							
ACROLEIN	6.0E-02			C				
ACRYLAMIDE	7.0E-01							
ACRYLIC ACID[RfC]	1.0E+00	A				E		
ACRYLONITRILE	5.0E+00			C				
ALLYL CHLORIDE[RfC]	1.0E+00	A				E		
AMMONIA	2.0E+02			C	D			
ANILINE[RfC]	1.0E+00	A				E		
ANTIMONY TRIOXIDE[RfC]	2.0E-01	A				E		
ARSENIC AND COMPOUNDS (INORGANIC)	3.0E-02			C	D			
ARSINE[RfC]	5.0E-02		B			E		
BENZENE	6.0E+01			C	D			
BENZIDINE (AND ITS SALTS)	1.0E+01							
BENZYL CHLORIDE	1.2E+01							
BERYLLIUM AND COMPOUNDS	7.0E-03			C	D			
BROMINE	1.7E+00							
BROMINE PENTAFLUORIDE	1.7E+00							
CADMIUM AND COMPOUNDS	2.0E-02			C				
CARBON DISULFIDE[RfC]	7.0E+02	A				E		
CARBON TETRACHLORIDE	4.0E+01			C	D			
CHLORINE	2.0E-01			C				
CHLORINE DIOXIDE	6.0E-01	A				E		
CHLOROBENZENE	1.0E+03			C	D			
CHLORODIFLUOROMETHANE[RfC]	5.0E+04	A				E		
CHLOROFLUOROCARBONS	7.0E+02							
CHLOROFORM	3.0E+02			C	D			
CHLOROPICRIN	4.0E-01			C				
CHLOROPRENE	1.0E+00							
CHROMIC TRIOXIDE (AS CHROMIC ACID MIST)	2.0E-03	A						
CHROMIUM 6+ (soluble except chromic trioxide)	2.0E-01			C	D			
COPPER AND COMPOUNDS	2.4E+00							

Table E.2 Noncancer Reference Exposure Levels (Chronic) Used In The HRA Program (Version 2.0e).								
Chemical	**Inhalation (µg/m³)**	**Modification Made To Database**						
CRESOLS (O-,M-,P-)	6.0E+02			C				
DI(2-ETHYLHEXYL)PHTHALATE (DEHP)	7.0E+01							
DIETHANOLAMINE	3.0E+00	A						
DIMETHYLAMINE	2.0E+00							
EGBE—ETHYLENE GLYCOL BUTYL ETHER	2.0E+01							
EGEE—ETHYLENE GLYCOL ETHYL ETHER	7.0E+01			C	D			
EGEEA—ETHYLENE GLYCOL ETHYL ETHER ACETATE	3.0E+02			C	D			
EGME—ETHYLENE GLYCOL METHYL ETHER	6.0E+01			C	D			
EGMEA—ETHYLENE GLYCOL METHYL ETHER ACETATE	9.0E+01			C	D			
EPICHLOROHYDRIN	3.0E+00		B			E		
ETHYL ACRYLATE	4.8E+01							
ETHYL BENZENE	2.0E+03	A						
ETHYL CHLORIDE	3.0E+04			C	D			
ETHYLENE DIBROMIDE	8.0E-01			C	D			
ETHYLENE DICHLORIDE	4.0E+02			C	D			
ETHYLENE GLYCOL	4.0E+02	A						
ETHYLENE OXIDE	3.0E+01			C	D			
FORMALDEHYDE	3.0E+00			C	D			
GASOLINE VAPORS	2.1E+03							
GLUTARALDEHYDE	8.0E-02			C				
HEXACHLOROBENZENE	2.8E+00							
HEXACHLOROCYCLOHEXANES	1.0E+00							
HEXACHLOROCYCLOPENTADIENE	2.4E-01							
HYDRAZINE	2.0E-01			C	D			
HYDROCHLORIC ACID	9.0E+00			C	D			
HYDROGEN BROMIDE	2.4E+01							
HYDROGEN CYANIDE	9.0E+00		B					
HYDROGEN FLUORIDE	5.9E+00							
HYDROGEN SULFIDE	1.0E+01			C	D			
ISOPHORONE	2.0E+03	A						
ISOPROPYL ALCOHOL	7.0E+03	A						
LEAD AND COMPOUNDS✳	REMOVED							G
LINDANE	1.0E+00							
MALEIC ANHYDRIDE	7.0E-01			C				
MANGANESE AND COMPOUNDS	2.0E-01		B					
MERCURY AND COMPOUNDS (INORGANIC)	9.0E-02			C	D			
METHANOL	4.0E+03			C	D			
METHYL BROMIDE	5.0E+00		B					
METHYL CHLOROFORM	1.0E+03			C	D			

Table E.2 Noncancer Reference Exposure Levels (Chronic) Used In The HRA Program (Version 2.0e).								
Chemical	**Inhalation (µg/m³)**	**Modification Made To Database**						
METHYL ETHYL KETONE[RfC]	1.0E+03	A				E		
METHYL ISOCYANATE	1.0E+00			C	D			
METHYL MERCURY	1.0E+00							
METHYL METHACRYLATE	9.8E+02							
METHYL TERT-BUTYL ETHER	8.0E+03	A						
METHYLENE CHLORIDE	4.0E+02			C	D			
METHYLENE DIPHENYL ISOCYANATE	7.0E-01	A						
METHYLENE DIPHENYL ISOCYANATE (POLYMERIC) [RfC]	2.0E-02	A				E		
MINERAL FIBERS (<1% FREE SILICA)	2.4E+01							
N-HEXANE	7.0E+03	A						
N,N-DIMETHYL FORMAMIDE	8.0E+01	A				~~E~~		
NAPHTHALENE	9.0E+00			C	D			
NICKEL AND COMPOUNDS	5.0E-02			C	D			
NICKEL OXIDE	1.0E-01	A						
NITROBENZENE	1.7E+00							
NITROGEN DIOXIDE	4.7E+02							
OZONE	1.8E+02							
P-DICHLOROBENZENE	8.0E+02		B			~~E~~		
PCB (POLYCHLORINATED BIPHENYLS)	1.2E+00							
CHLORINATED DIBENZO-P-DIOXINS (AS 2,3,7,8-EQUIV) [PCDD]•	4.0E-05			C	D			
PCDD AS 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	4.0E-05	A						
PCDD AS 1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	8.0E-05	A						
PCDD AS 1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	4.0E-04	A						
PCDD AS 1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	4.0E-04	A						
PCDD AS 1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	4.0E-04	A						
PCDD AS 1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	4.0E-03	A						
PCDD AS 1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	4.0E-02	A						
CHLORINATED DIBENZOFURANS (AS 2,3,7,8-EQUIV) [PCDF]•	4.0E-05			C	D			
PCDF AS 2,3,7,8-TETRACHLORODIBENZOFURAN	4.0E-04	A						
PCDF AS 1,2,3,7,8-PENTACHLORODIBENZOFURAN	8.0E-04	A						
PCDF AS 2,3,4,7,8-PENTACHLORODIBENZOFURN	8.0E-05	A						
PCDF AS 1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	4.0E-04	A						
PCDF AS 1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	4.0E-04	A						
PCDF AS 1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	4.0E-04	A						
PCDF AS 2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	4.0E-04	A						
PCDF AS 1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	4.0E-03	A						
PCDF AS 1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	4.0E-03	A						
PCDF AS 1,2,3,4,6,7,8,9 –OCTACHLORODIBENZOFURAN	4.0E-02	A						
PARTICULATE EMISSIONS FROM DIESEL-FUELED ENGINES■	5.0E+00	A						

Table E.2 Noncancer Reference Exposure Levels (Chronic) Used In The HRA Program (Version 2.0e).								
Chemical	**Inhalation (µg/m³)**	**Modification Made To Database**						
PENTACHLOROPHENOL	2.0E-01							
PERCHLOROETHYLENE	3.5E+01							
PHENOL	2.0E+02			C	D			
PHOSPHINE[RfC]	3.0E-01		B			E		
PHOSPHORIC ACID	7.0E+00	A						
PHOSPHORUS (WHITE)	7.0E-02							
PHTHALIC ANHYDRIDE	2.0E+01			C	D			
PROPYLENE (PROPENE)	3.0E+03	A						
PROPYLENE GLYCOL MONOMETHYL ETHER	7.0E+03	A						
PROPYLENE OXIDE	3.0E+01				D			
SELENIUM AND COMPOUNDS (other than hydrogen selenide)	2.0E+01			C	D			
SODIUM HYDROXIDE	4.8E+00							
STYRENE	9.0E+02		B					
SULFATES	2.5E+01							
SULFUR DIOXIDE	6.6E+02							
SULFURIC ACID	1.0E+00	A						
TETRACHLOROPHENOLS	8.8E+01							
TOLUENE	3.0E+02		B					
TOLUENE-2,4-DIISOCYANATE	7.0E-02		B			E		
TOLUENE-2,6-DIISOCYANATE	7.0E-02		B			E		
TRICHLOROETHYLENE	6.0E+02			C	D			
TRIETHYLAMINE[RfC]	7.0E+00	A				E		
VINYL ACETATE	2.0E+02	A				E		
VINYL BROMIDE[RfC]	7.0E+00	A				E		
VINYL CHLORIDE	2.6E+01							
VINYLIDENE CHLORIDE	7.0E+01			C				
XYLENES	7.0E+02			C	D			
ZINC COMPOUNDS	3.5E+01							

✣	1,4-Dioxane: The chronic REL for 1,4-Dioxane is incorrectly listed as 4.0E+00 in some editions of the *CAPCOA Revised 1992 Risk Assessment Guidelines (October 1993)*.
✴	Inorganic Lead: Inorganic Lead was identified by the Air Resources Board as a Toxic Air Contaminant in April 1997. Since information on non-cancer health effects show no identified threshold, no Reference Exposure Level has been developed. However, guidelines for assessing noncancer health impacts are currently being developed by Air Resources Board staff in conjunction with OEHHA.
■	Particulate Emissions from Diesel-Fueled Engines: The unit risk factor and chronic Reference Exposure Level (REL) were derived from whole diesel exhaust and should be used only for impacts from the inhalation pathway. The inhalation impacts from speciated emissions from diesel-fueled engines are already accounted for in the unit risk factor and REL. However, at the discretion of the risk assessor, speciated emissions from diesel-fueled engines may be used to estimate acute noncancer health impacts or the contribution to cancer risk or chronic noncancer health impacts for the non-inhalation exposure pathway.
•	Chlorinated Dibenzo-*p*-dioxins and Chlorinated Dibenzofurans (also referred to as Polychlorinated dioxins and dibenzofurans): The OEHHA has adopted the International Toxicity Equivalency Factor (ITEF) scheme for evaluating the cancer risk due to exposure to samples containing mixtures of chlorinated dibenzo-*p*-dioxins (PCDD) and chlorinated dibenzofurans (PCDF). See Appendix A of OEHHA's *Technical Support Document For Describing Available Cancer Potency Factors* for more information about the scheme. See Appendix G of the *CAPCOA Revised 1992 Risk Assessment Guidelines* for the methodology for calculating 2,3,7,8-equivalents for PCDD and PCDFs. Users of the Health Risk Assessment Computer Program should not simultaneously use the individual congeners and total PCDD and PCDF congeners in this program. Caution should be used to NOT DOUBLE COUNT the impacts of total PCDD and PCDF (as 2,3,7,8-equivalents) and the individual congeners. In addition, it is recommended the individual congeners be used to evaluate PCDD and PCDF (see Appendix A, OEHHA's *Technical Support Document For Describing Available Cancer Potency Factors*) rather than use the method for total PCDD and PCDF outlined in Appendix G of the *CAPCOA Revised 1992 Risk Assessment Guidelines*.
RfC/RfD	U.S. EPA Reference Concentrations (RfCs) from the U.S. EPA Integrated Risk Information System (1996). The RfCs listed meet the criteria of Appendix F of the Air Resources Board's Emission Inventory Criteria and Guidelines Report effective July 1, 1997. An updated list of chronic noncancer Reference Exposure Levels will be available after Scientific Review Panel review and adoption by the Director of the Office of Environmental Health Hazard Assessment.

Modification Made to Database:

A. New substance added to database since September 1996 update (includes health value and target organ).
B. New health value and/or target organ added for substance previously listed in September 1996 version of the database. (Substance previously did not have a value in this category).
C. Change in health value. (Substance previously had a health value listed in this category in September 1996 version of the database).
D. Target organ change.
E. U.S. EPA Reference Concentration (RfC) replaced CAPCOA chronic Reference Exposure Level (REL). The U.S. EPA RfC may be replaced when OEHHA completes its *Technical Support Document for the Determination of Chronic Noncancer Reference Exposure Levels*.
~~E~~ U.S. EPA Reference Concentration has been replaced with a new OEHHA Reference Exposure Level.
F. Substance in September 1996 version had a preliminary cancer potency value.
G. Health value dropped from database.

Table last updated: March 4, 2002

APPENDIX H

Oral Cancer Potency Values and Oral Chronic RELs

Used in the HRA Program (Version 2.0e)

Table H.1 Oral Cancer Potency Values And Oral Chronic RELs Used In The HRA Program (Version 2.0e)

Chemical	Chronic Oral REL (mg/kg/d)	Oral Cancer Potency Value $(mg/kg\text{-}d)^{-1}$	Modifications Made to Database						
2-CHLOROPHENOL	5.0E-03	N/A							
2,4,5-TRICHLOROPHENOL	REMOVED	N/A							G
2,4,6-TRICHLOROPHENOL	N/A	7.0E-02							
4,4'-METHYLENE DIANILINE		1.6E+00							
ARSENIC AND COMPOUNDS (INORGANIC) [RfD]	3.0E-04	1.5E+00			C	D			
BERYLLIUM	2.0E-03	REMOVED			C		E		G
CADMIUM AND COMPOUNDS	5.0E-04	N/A							
CHLOROBENZENE	REMOVED	N/A							G
CHROMIUM 6+	2.0E-02	4.2E-01			C	D			
DIETHYLHEXYLPHTHALATE		8.4E-03	A						
HEXACHLOROBENZENE	REMOVED	REMOVED							G
HEXACHLOROCYCLOHEXANES	3.0E-04	4.0E+00							
HYDRAZINE		3.0E+00	A						
LEAD AND COMPOUNDS	N/A[⌘]	8.5E-03		B					
LINDANE	3.0E-04	1.1E+00	A						
MERCURY AND COMPOUNDS (INORGANIC)	3.0E-04	N/A		B					
N-NITROSO-N-DIBUTYLAMINE	N/A	REMOVED							G
N-NITROSODI-N-PROPYLAMINE	N/A	REMOVED							G
N-NITROSODIETHYLAMINE	N/A	REMOVED							G
N-NITROSODIMETHYLAMINE	N/A	REMOVED							G
N-NITROSO-N-METHYLETHYLAMINE	N/A	REMOVED							G
N-NITROSOMORPHOLINE	N/A	REMOVED							G
N-NITROSOPIPERIDINE	N/A	REMOVED							G
N-NITROSOPYRROLIDINE	N/A	REMOVED							G
NAPHTHALENE	REMOVED	N/A							G
NICKEL AND COMPOUNDS[TAC]	5.2E-02	N/A	A						
NICKEL OXIDE	5.0E-02	N/A	A						
P-DICHLOROBENZENE	REMOVED	REMOVED							G
P-NITROSODIPHENYLAMINE	N/A	REMOVED							G
PAH AS 1,6-DINITROPYRENE[❖]	N/A	1.2E+02							
PAH AS 1,8-DINITROPYRENE[❖]	N/A	1.2E+01							
PAH AS 1-NITROPYRENE[❖]	N/A	1.2E+00							
PAH AS 2-NITROFLUORENE[❖]	N/A	1.2E-01							
PAH AS 3-METHYLCHOLANTHRENE[❖]	N/A	2.2E+01							
PAH AS 4-NITROPYRENE[❖]	N/A	1.2E+00							
PAH AS 5-METHYLCHRYSENE[❖]	N/A	1.2E+01							
PAH AS 5-NITROACENAPHTHENE[❖]	N/A	1.3E-01							
PAH AS 6-NITROCHRYSENE[❖]	N/A	1.2E+02							
PAH AS 7,12-DIMETHYLBENZ(A)ANTHRACENE[❖]	N/A	2.5E+02							
PAH AS 7H-DIBENZO(C,G)CARBAZOLE[❖]	N/A	1.2E+01							
PAH AS BENZ(A)ANTHRACENE[❖]	N/A	1.2E+00							
PAH AS BENZO(A)PYRENE[❖]	N/A	1.2E+01							
PAH AS BENZO(B)FLUORANTHENE[❖]	N/A	1.2E+00							
PAH AS BENZO(J)FLUORANTHENE[❖]	N/A	1.2E+00							
PAH AS BENZO(K)FLUORANTHENE[❖]	N/A	1.2E+00							

Table H.1 Oral Cancer Potency Values And Oral Chronic RELs Used In The HRA Program (Version 2.0e)

Chemical	Chronic Oral REL (mg/kg/d)	Oral Cancer Potency Value $(mg/kg\text{-}d)^{-1}$	Modifications Made to Database						
PAH AS CHRYSENE❖	N/A	1.2E-01							
PAH AS DIBENZ(A,H)ACRIDINE❖	N/A	1.2E+00							
PAH AS DIBENZ(A,H)ANTHRACENE❖	N/A	4.1E+00							
PAH AS DIBENZ(A,J)ACRIDINE❖	N/A	1.2E+00							
PAH AS DIBENZO(A,E)PYRENE❖	N/A	1.2E+01							
PAH AS DIBENZO(A,H)PYRENE❖	N/A	1.2E+02							
PAH AS DIBENZO(A,I)PYRENE❖	N/A	1.2E+02							
PAH AS DIBENZO(A,L)PYRENE❖	N/A	1.2E+02							
PAH AS INDENO(1,2,3-C,D)PYRENE❖	N/A	1.2E+00							
PCB (POLYCHLORINATED BIPHENYLS) [low risk] RfD ★	2.0E-05	7.0E-02			C				
PCB (POLYCHLORINATED BIPHENYLS) [high risk] RfD ★	2.0E-05	2.0E+00			C		E		
CHLORINATED DIBENZO-P-DIOXINS (AS 2,3,7,8-EQUIV) [PCDD]•	1.0E-08	1.3E+05							
PCDD AS 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.0E-08	1.3E+05	A						
PCDD AS 1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	2.0E-08	6.5E+04	A						
PCDD AS 1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.0E-07	1.3E+04	A						
PCDD AS 1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.0E-07	1.3E+04	A						
PCDD AS 1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	1.0E-07	1.3E+04	A						
PCDD AS 1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	1.0E-06	1.3E+03	A						
PCDD AS 1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	1.0E-05	1.3E+02	A						
CHLORINATED DIBENZOFURANS (AS 2,3,7,8-EQUIV) [PCDF]•	1.0E-08	1.3E+05							
PCDF AS 2,3,7,8-TETRACHLORODIBENZOFURAN	1.0E-07	1.3E+04	A						
PCDF AS 1,2,3,7,8-PENTACHLORODIBENZOFURAN	2.0E-07	6.5E+03	A						
PCDF AS 2,3,4,7,8-PENTACHLORODIBENZOFURN	2.0E-08	6.5E+04	A						
PCDF AS 1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	1.0E-07	1.3E+04	A						
PCDF AS 1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	1.0E-07	1.3E+04	A						
PCDF AS 1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1.0E-07	1.3E+04	A						
PCDF AS 2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.0E-07	1.3E+04	A						
PCDF AS 1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	1.0E-06	1.3E+03	A						
PCDF AS 1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.0E-06	1.3E+03	A						
PCDF AS 1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	1.0E-05	1.3E+02	A						
PENTACHLOROPHENOL	REMOVED	REMOVED							G

N/A = Oral potency value or oral REL not available

• Chlorinated Dibenzo-*p*-dioxins and Chlorinated Dibenzofurans (also referred to as Polychlorinated dioxins and dibenzofurans): The OEHHA has adopted the International Toxicity Equivalency Factor (ITEF) scheme for evaluating the cancer risk due to exposure to samples containing mixtures of chlorinated dibenzo-*p*-dioxins (PCDD) and chlorinated dibenzofurans (PCDF). See Appendix A of OEHHA's *Technical Support Document For Describing Available Cancer Potency Factors* for more information about the scheme. See Appendix G of the *CAPCOA Revised 1992 Risk Assessment Guidelines* for the methodology for calculating 2,3,7,8-equivalents for PCDD and PCDFs. Users of the Health Risk Assessment (HRA) Computer Program should not simultaneously use the individual congeners and total PCDD and PCDF congeners in this program. Caution should be used to NOT DOUBLE COUNT the impacts of total PCDD and PCDF (as 2,3,7,8-equivalents) and the individual congeners. In addition, it is recommended the individual congeners be used to evaluate PCDD and PCDF (see Appendix A, OEHHA's *Technical Support Document For Describing Available Cancer Potency Factors*) rather than use the method for total PCDD and PCDF outlined in Appendix G of the *CAPCOA Revised 1992 Risk Assessment Guidelines*. Mother's Milk Pathway Calculation in HRA Computer Program: The HRA Program cannot calculate the 44-year cancer risk from mother's milk for the individual chlorinated dioxin and furan congeners due to the HRA Program's source coding structure. However, the mother's milk pathway can be calculated for total chlorinated dioxins and furans.
★ Polychlorinated Biphenyls: Chronic Oral: The chronic oral value is U.S. EPA's 1996 oral Reference Dose for Aroclor-1254. Low Risk: For use in cases where congeners with more than four chlorines comprise less than one-half percent of total polychlorinated biphenyls. High Risk: For use in cases where congeners with more than four chlorines do not comprise less than one-half percent of total polychlorinated biphenyls. Mother's Milk Pathway Calculation in HRA Computer Program: The HRA Program cannot calculate the 44-year cancer risk from mother's milk for polychlorinated biphenyls due to the HRA Program's source coding structure.
⌘ The Oral REL for lead has been removed from the HRA program. The chronic noncancer oral lead pathway risk is adequately addressed when assessing noncancer chronic inhalation exposure to lead
❖ Polycyclic Aromatic Hydrocarbons (PAHs): PAH oral potency values have been adjusted by the Potency Equivalency Factors (PEFs) which were approved by the Scientific Review Panel in April 1994. These PEF adjusted health values do not appear in the *CAPCOA Revised 1992 Risk Assessment Guidelines (October 1993)*.
RfC/RfD U.S. EPA Reference Concentrations (RfCs) from the U.S. EPA Integrated Risk Information System (1996). The RfCs listed meet the criteria of Appendix F of the Air Resources Board's Emission Inventory Criteria and Guidelines Report effective July 1, 1997. An updated list of chronic noncancer Reference Exposure Levels will be available after Scientific Review Panel review and adoption by the Director of the Office of Environmental Health Hazard Assessment.
Modification Made to Database: A. New substance added to database since September 1996 update (includes health value and target organ). B. New health value and/or target organ added for substance previously listed in September 1996 version of the database. (Substance previously did not have a value in this category). C. Change in health value. (Substance previously had a health value listed in this category in September 1996 version of the database). D. Target organ change. E. U.S. EPA Reference Concentration (RfC) replaced CAPCOA chronic Reference Exposure Level (REL). The U.S. EPA RfC may be replaced when OEHHA completes its *Technical Support Document for the Determination of Chronic Noncancer Reference Exposure Levels.* ~~E~~ U.S. EPA Reference Concentration has been replaced with a new OEHHA Reference Exposure Level. F. Substance in September 1996 version had a preliminary cancer potency value. G. Health value dropped from database.

Table last updated: March 4, 2002

APPENDIX I

Chemicals that can be Evaluated by the HRA Program (Version 2.0e) and Applicable Analysis

Table I.1 Chemicals That Can Be Evaluated By The HRA Program (Version 2.0e) And Applicable Analysis.					
	Noncancer Effects			Cancer Risk	
Chemical	**Acute Inhalation**	**Chronic Inhalation**	**Chronic Oral**	**Inhalation**	**Multi-Pathway**
1,1,-DICHLOROETHANE				✓	
1,1,2-TRICHLOROETHANE (VINYL TRICHLORIDE)				✓	
1,1,2,2-TETRACHLOROETHANE				✓	
1,2-DIBROMO-3-CHLOROPROPANE (DBCP)		✓		✓	
1,2-EPOXYBUTANE		✓			
1,3-BUTADIENE[TAC]		✓		✓	
1,3-PROPANE SULTONE				✓	
1,4-DIOXANE[✣]	✓	✓		✓	
2-AMINOANTHRAQUINONE				✓	
2-CHLOROACETOPHENONE[RfC]		✓			
2-CHLOROPHENOL		✓	✓		
2-NITROPROPANE		✓			
2,4-DIAMINOANISOLE				✓	
2,4-DIAMINOTOLUENE				✓	
2,4-DINITROTOLUENE				✓	
2,4,5-TRICHLOROPHENOL					
2,4,6-TRICHLOROPHENOL				✓	✓
3,3-DICHLOROBENZIDINE				✓	
4,4-METHYLENE BIS (2-CHLOROANILINE) (MOCA)				✓	
4,4'-METHYLENE DIANILINE (AND ITS DICHLORIDE)		✓		✓	✓
4-CHLORO-O-PHENYLENEDIAMINE				✓	
ACETALDEHYDE		✓		✓	
ACETAMIDE				✓	
ACROLEIN	✓	✓			
ACRYLAMIDE		✓		✓	
ACRYLIC ACID[RfC]	✓	✓			

Table I.1 Chemicals That Can Be Evaluated By The HRA Program (Version 2.0e) And Applicable Analysis.					
	Noncancer Effects			Cancer Risk	
Chemical	**Acute Inhalation**	**Chronic Inhalation**	**Chronic Oral**	**Inhalation**	**Multi-Pathway**
ACRYLONITRILE		✓		✓	
ALLYL CHLORIDE[RfC]		✓		✓	
AMMONIA[RfC]	✓	✓			
ANILINE[RfC]		✓		✓	
ANTIMONY TRIOXIDE[RfC]		✓			
ARSENIC AND COMPOUNDS (INORGANIC)[TAC RfD]	✓	✓	✓	✓	✓
ARSINE[RfC]	✓	✓			
ASBESTOS[TAC ¤]				✓	
BENZENE[TAC]	✓	✓		✓	
BENZIDINE (AND ITS SALTS)		✓		✓	
BENZYL CHLORIDE	✓	✓		✓	
BERYLLIUM AND COMPOUNDS		✓	✓	✓	
BIS(2-CHLOROETHYL)ETHER				✓	
BIS(CHLOROMETHYL)ETHER				✓	
BROMINE		✓			
BROMINE PENTAFLUORIDE		✓			
CADMIUM AND COMPOUNDS[TAC]		✓	✓	✓	
CARBON DISULFIDE[RfC]	✓	✓			
CARBON MONOXIDE	✓				
CARBON TETRACHLORIDE[TAC]	✓	✓		✓	
CHLORINATED PARAFFINS				✓	
CHLORINE	✓	✓			
CHLORINE DIOXIDE		✓			
CHLOROBENZENE		✓			
CHLORODIFLUOROMETHANE[RfC]		✓			
CHLOROFLUOROCARBONS		✓			

Table I.1 Chemicals That Can Be Evaluated By The HRA Program (Version 2.0e) And Applicable Analysis.					
	Noncancer Effects			Cancer Risk	
Chemical	**Acute Inhalation**	**Chronic Inhalation**	**Chronic Oral**	**Inhalation**	**Multi-Pathway**
CHLOROFORM[TAC]	✓	✓		✓	
CHLOROPICRIN	✓	✓			
CHLOROPRENE		✓			
CHROMIC TRIOXIDE		✓			
CHROMIUM 6+[TAC]		✓	✓	✓	✓
COPPER AND COMPOUNDS	✓	✓			
CRESOLS (O-,M-,P-)		✓			
CUPFERRON				✓	
DI(2-ETHYLHEXYL)PHTHALATE (DEHP)		✓		✓	✓
DIETHANOLAMINE		✓			
DIMETHYLAMINE		✓			
EPICHLOROHYDRIN	✓	✓		✓	
EGBE—ETHYLENE GLYCOL BUTYL ETHER	✓	✓			
EGEE—ETHYLENE GLYCOL ETHYL ETHER[RfC]	✓	✓			
EGEEA—ETHYLENE GLYCOL ETHYL ETHER ACETATE	✓	✓			
EGME—ETHYLENE GLYCOL METHYL ETHER[RfC]	✓	✓			
EGMEA—ETHYLENE GLYCOL METHYL ETHER ACETATE		✓			
ETHYL ACRYLATE		✓			
ETHYL BENZENE		✓			
ETHYL CHLORIDE		✓			
ETHYLENE DIBROMIDE[TAC]		✓		✓	
ETHYLENE DICHLORIDE[TAC]		✓		✓	
ETHYLENE GLYCOL		✓			
ETHYLENE OXIDE[TAC]		✓		✓	
ETHYLENE THIOUREA				✓	
FORMALDEHYDE[TAC]	✓	✓		✓	

Table I.1 Chemicals That Can Be Evaluated By The HRA Program (Version 2.0e) And Applicable Analysis.					
	Noncancer Effects			Cancer Risk	
Chemical	**Acute Inhalation**	**Chronic Inhalation**	**Chronic Oral**	**Inhalation**	**Multi-Pathway**
GASOLINE VAPORS		✓			
GLUTARALDEHYDE		✓			
HEXACHLOROBENZENE		✓		✓	
HEXACHLOROCYCLOHEXANES		✓	✓	✓	✓
HEXACHLOROCYCLOPENTADIENE		✓			
HYDRAZINE		✓		✓	✓
HYDROCHLORIC ACID	✓	✓			
HYDROGEN BROMIDE		✓			
HYDROGEN CYANIDE	✓	✓			
HYDROGEN FLUORIDE	✓	✓			
HYDROGEN SELENIDE	✓				
HYDROGEN SULFIDE	✓	✓			
ISOPHORONE		✓			
ISOPROPYL ALCOHOL	✓	✓			
LEAD AND COMPOUNDS[?TAC ✷]				✓	✓
LINDANE		✓	✓	✓	✓
MALEIC ANHYDRIDE		✓			
MANGANESE AND COMPOUNDS[RfC]		✓			
MERCURY AND COMPOUNDS (INORGANIC)[RfC]	✓	✓	✓		
METHANOL	✓	✓			
METHYL BROMIDE	✓	✓			
METHYL CHLOROFORM	✓	✓			
METHYL ETHYL KETONE[RfC]	✓	✓			
METHYL ISOCYANATE		✓			
METHYL MERCURY		✓			
METHYL METHACRYLATE		✓			

Table I.1 Chemicals That Can Be Evaluated By The HRA Program (Version 2.0e) And Applicable Analysis.					
	Noncancer Effects			Cancer Risk	
Chemical	**Acute Inhalation**	**Chronic Inhalation**	**Chronic Oral**	**Inhalation**	**Multi-Pathway**
METHYL TERT-BUTYL ETHER		✓		✓	
METHYLENE CHLORIDE[TAC]	✓	✓		✓	
METHYLENE DIPHENYL ISOCYANATE		✓			
METHYLENE DIPHENYL ISOCYANATE (POLYMERIC)[RfC]		✓			
MICHLER'S KETONE				✓	
MINERAL FIBERS (<1% FREE SILICA)		✓			
N-HEXANE		✓			
N-NITROSO-N-DIBUTYLAMINE				✓	
N-NITROSODI-N-PROPYLAMINE				✓	
N-NITROSODIETHYLAMINE				✓	
N-NITROSODIMETHYLAMINE				✓	
N-NITROSODIPHENYLAMINE				✓	
N-NITROSO-N-METHYLETHYLAMINE				✓	
N-NITROSOMORPHOLINE				✓	
N-NITROSOPIPERIDINE				✓	
N-NITROSOPYRROLIDINE				✓	
N,N-DIMETHYL FORMAMIDE		✓			
NAPHTHALENE		✓			
NICKEL AND COMPOUNDS[TAC]	✓	✓	✓	✓	
NICKEL OXIDE	✓	✓	✓	✓	
NITRIC ACID	✓				
NITROBENZENE		✓			
NITROGEN DIOXIDE	✓	✓			
OZONE	✓	✓			
P-CHLORO-O-TOLUIDINE				✓	
P-CRESIDINE				✓	

Table I.1 Chemicals That Can Be Evaluated By The HRA Program (Version 2.0e) And Applicable Analysis.					
	Noncancer Effects			Cancer Risk	
Chemical	**Acute Inhalation**	**Chronic Inhalation**	**Chronic Oral**	**Inhalation**	**Multi-Pathway**
P-DICHLOROBENZENE		✓		✓	
P-DIMETHYLAMINOAZOBENZENE				✓	
P-NITROSODIPHENYLAMINE				✓	
PAH AS 1,6-DINITROPYRENE❖				✓	✓
PAH AS 1,8-DINITROPYRENE❖				✓	✓
PAH AS 1-NITROPYRENE❖				✓	✓
PAH AS 2-NITROFLUORENE❖				✓	✓
PAH AS 3-METHYLCHOLANTHRENE❖				✓	✓
PAH AS 4-NITROPYRENE❖				✓	✓
PAH AS 5-METHYLCHRYSENE❖				✓	✓
PAH AS 5-NITROACENAPHTHENE❖				✓	✓
PAH AS 6-NITROCHRYSENE❖				✓	✓
PAH AS 7,12-DIMETHYLBENZ(A)ANTHRACENE❖				✓	✓
PAH AS 7H-DIBENZO(C,G)CARBAZOLE❖				✓	✓
PAH AS BENZ(A)ANTHRACENE❖				✓	✓
PAH AS BENZO(A)PYRENE❖				✓	✓
PAH AS BENZO(B)FLUORANTHENE❖				✓	✓
PAH AS BENZO(J)FLUORANTHENE❖				✓	✓
PAH AS BENZO(K)FLUORANTHENE❖				✓	✓
PAH AS CHRYSENE❖				✓	✓
PAH AS DIBENZ(A,H)ACRIDINE❖				✓	✓
PAH AS DIBENZ(A,H)ANTHRACENE❖				✓	✓
PAH AS DIBENZ(A,J)ACRIDINE❖				✓	✓
PAH AS DIBENZO(A,E)PYRENE❖				✓	✓
PAH AS DIBENZO(A,H)PYRENE❖				✓	✓
PAH AS DIBENZO(A,I)PYRENE❖				✓	✓

Table I.1 Chemicals That Can Be Evaluated By The HRA Program (Version 2.0e) And Applicable Analysis.					
	Noncancer Effects			Cancer Risk	
Chemical	**Acute Inhalation**	**Chronic Inhalation**	**Chronic Oral**	**Inhalation**	**Multi-Pathway**
PAH AS DIBENZO(A,L)PYRENE❖				✓	✓
PAH AS INDENO(1,2,3-C,D)PYRENE❖				✓	✓
PCB (POLYCHLORINATED BIPHENYLS) [low risk] RfD ★		✓	✓	✓	✓
PCB (POLYCHLORINATED BIPHENYLS) [high risk] RfD ★		✓	✓	✓	✓
CHLORINATED DIBENZO-P-DIOXINS (AS 2,3,7,8-EQUIV) [PCDD] TAC •		✓	✓	✓	✓
PCDD AS 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN TAC		✓	✓	✓	✓
PCDD AS 1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN		✓	✓	✓	✓
PCDD AS 1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN		✓	✓	✓	✓
PCDD AS 1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN		✓	✓	✓	✓
PCDD AS 1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN		✓	✓	✓	✓
PCDD AS 1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN		✓	✓	✓	✓
PCDD AS 1,2,3,4,5,6,7,8-OCTACHLORODIBENZO-P-DIOXIN		✓	✓	✓	✓
CHLORINATED DIBENZOFURANS (AS 2,3,7,8-EQUIV) [PCDF] TAC •		✓	✓	✓	✓
PCDF AS 2,3,7,8-TETRACHLORODIBENZOFURAN		✓	✓	✓	✓
PCDF AS 1,2,3,7,8-PENTACHLORODIBENZOFURAN		✓	✓	✓	✓
PCDF AS 2,3,4,7,8-PENTACHLORODIBENZOFURN		✓	✓	✓	✓
PCDF AS 1,2,3,4,7,8-HEXACHLORODIBENZOFURAN		✓	✓	✓	✓
PCDF AS 1,2,3,6,7,8-HEXACHLORODIBENZOFURAN		✓	✓	✓	✓
PCDF AS 1,2,3,7,8,9-HEXACHLORODIBENZOFURAN		✓	✓	✓	✓
PCDF AS 2,3,4,6,7,8-HEXACHLORODIBENZOFURAN		✓	✓	✓	✓
PCDF AS 1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN		✓	✓	✓	✓
PCDF AS 1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN		✓	✓	✓	✓
PCDF AS 1,2,3,4,5,6,7,8-OCTACHLORODIBENZOFURAN		✓	✓	✓	✓
PARTICULATE EMISSIONS FROM DIESEL-FUELED ENGINES TAC ■		✓		✓	
PENTACHLOROPHENOL		✓		✓	
PERCHLOROETHYLENE TAC	✓	✓		✓	

Table I.1 Chemicals That Can Be Evaluated By The HRA Program (Version 2.0e) And Applicable Analysis.					
	Noncancer Effects			Cancer Risk	
Chemical	**Acute Inhalation**	**Chronic Inhalation**	**Chronic Oral**	**Inhalation**	**Multi-Pathway**
PHENOL	✓	✓			
PHOSGENE	✓				
PHOSPHINE[RfC]		✓			
PHOSPHORIC ACID		✓			
PHOSPHORUS (WHITE)		✓			
PHTHALIC ANHYDRIDE		✓			
POTASSIUM BROMATE				✓	
PROPYLENE (PROPENE)		✓			
PROPYLENE GLYCOL MONOMETHYL ETHER		✓			
PROPYLENE OXIDE	✓	✓		✓	
SELENIUM AND COMPOUNDS (other than hydrogen selenide)		✓			
SODIUM HYDROXIDE	✓	✓			
STYRENE	✓	✓			
SULFATES	✓	✓			
SULFUR DIOXIDE	✓	✓			
SULFURIC ACID AND OLEUM	✓	✓			
TETRACHLOROPHENOLS		✓			
THIOACETAMIDE				✓	
TOLUENE	✓	✓			
TOLUENE-2,4-DIISOCYANATE		✓		✓	
TOLUENE-2,6-DIISOCYANATE		✓		✓	
TRICHLOROETHYLENE[TAC]		✓		✓	
TRIETHYLAMINE[RfC]	✓	✓			
URETHANE				✓	
VANADIUM PENTOXIDE	✓				
VINYL ACETATE		✓			

Table I.1 Chemicals That Can Be Evaluated By The HRA Program (Version 2.0e) And Applicable Analysis.					
	Noncancer Effects			Cancer Risk	
Chemical	**Acute Inhalation**	**Chronic Inhalation**	**Chronic Oral**	**Inhalation**	**Multi-Pathway**
VINYL BROMIDE[RfC]		✓			
VINYL CHLORIDE[TAC]	✓	✓		✓	
VINYLIDENE CHLORIDE		✓			
XYLENES	✓	✓			
ZINC COMPOUNDS		✓			

FOOTNOTES	
RfC/RfD	U.S. EPA Reference Concentrations (RfCs) and oral Reference Doses (RfDs) from the U.S. EPA Integrated Risk Information System (1996) have been added if the U.S. EPA health value and/or endpoint was different from the CAPCOA value or endpoint. The RfCs and RfDs listed meet the criteria of Appendix F of the Air Resources Board's Emission Inventory Criteria and Guidelines Report effective July 1, 1997. An updated list of chronic noncancer Reference Exposure Levels will be available after Scientific Review Panel review and adoption by the Director of the Office of Environmental Health Hazard Assessment.
TAC	The Air Resources Board has identified substance as a Toxic Air Contaminant.
¤	Asbestos: The units for the Unit Risk factor for asbestos are $(100 \text{ fibers/m}^3)^{-1}$. A conversion factor of 100 fibers/0.003 µg can be multiplied by a receptor concentration of asbestos expressed in $\mu g/m^3$. Unless other information necessary to estimate the concentration ($fibers/m^3$) of asbestos at receptors of interest is available, the use of the aforementioned conversion factor is an option. For more information on asbestos quantity conversion factors, see Appendix D of OEHHA's *Technical Support Document For Describing Available Cancer Potency Factors.* This health value is not included in the Health Risk Assessment (HRA) Computer Program (2.0e) database.
✣	1,4-Dioxane: The acute and chronic RELs for 1,4-Dioxane are incorrectly listed as 2.0E+01 and 4.0E+00 respectively in some editions of the *CAPCOA Revised 1992 Risk Assessment Guidelines (October 1993)*.
✴	Inorganic Lead: Inorganic Lead was identified by the Air Resources Board as a Toxic Air Contaminant in April 1997. Since information on non-cancer health effects show no identified threshold, no Reference Exposure Level has been developed. However, guidelines for assessing noncancer health impacts are currently being developed by Air Resources Board staff in conjunction with the Office of Environmental Health Hazard Assessment.
■	Particulate Emissions from Diesel-Fueled Engines: The unit risk factor and chronic Reference Exposure Level (REL) were derived from whole diesel exhaust and should be used only for impacts from the inhalation pathway. The inhalation impacts from speciated emissions from diesel-fueled engines are already accounted for in the unit risk factor and REL. However, at the discretion of the risk assessor, speciated emissions from diesel-fueled engines may be used to estimate acute noncancer health impacts or the contribution to cancer risk or chronic noncancer health impacts for the non-inhalation exposure pathway.

❖	Polycyclic Aromatic Hydrocarbons (PAHs): PAH unit risk factors have been adjusted by the Potency Equivalency Factors (PEFs) which were approved by the Scientific Review Panel in April 1994. These PEF adjusted health values do not appear in the *CAPCOA Revised 1992 Risk Assessment Guidelines (October 1993)*.
★	Polychlorinated Biphenyls: Chronic Oral: The chronic oral value is U.S. EPA's 1996 oral Reference Dose for Aroclor-1254. Low Risk: For use in cases where congeners with more than four chlorines comprise less than one-half percent of total polychlorinated biphenyls. High Risk: For use in cases where congeners with more than four chlorines do not comprise less than one-half percent of total polychlorinated biphenyls. Mother's Milk Pathway Calculation in HRA Computer Program: The HRA Program cannot calculate the 44-year cancer risk from mother's milk for polychlorinated biphenyls due to the HRA Program's source coding structure.
•	Polychlorinated Dibenzo-*p*-dioxins and Polychlorinated Dibenzofurans (also referred to as chlorinated dioxins and dibenzofurans): The OEHHA has adopted the International Toxicity Equivalency Factor (ITEF) scheme for evaluating the cancer risk due to exposure to samples containing mixtures of polychlorinated dibenzo-*p*-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF). See Appendix A of OEHHA's *Technical Support Document For Describing Available Cancer Potency Factors* for more information about the scheme. See Appendix G of the *CAPCOA Revised 1992 Risk Assessment Guidelines* for the methodology for calculating 2,3,7,8-equivalents for PCDD and PCDFs. Users of the Health Risk Assessment Computer Program should not simultaneously use the individual congeners and total PCDD and PCDF congeners in this program. Caution should be used to NOT DOUBLE COUNT the impacts of total PCDD and PCDF (as 2,3,7,8-equivalents) and the individual congeners. In addition, it is recommended the individual congeners be used to evaluate PCDD and PCDF (see Appendix A, OEHHA's *Technical Support Document For Describing Available Cancer Potency Factors*) rather than use the method for total PCDD and PCDF outlined in Appendix G of the *CAPCOA Revised 1992 Risk Assessment Guidelines*. Mother's Milk Pathway Calculation in HRA Computer Program: The HRA Program cannot calculate the 44-year cancer risk from mother's milk for the individual chlorinated dioxin and furan congeners due to the HRA Program's source coding structure. However, the mother's milk pathway can be calculated for total chlorinated dioxins and furans.

Table last updated: March 4, 2002